

### AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of determining ~~[[the]]~~ a concavity and/or a convexity on a sample, comprising the steps of:

scanning a portion of a sample including a plurality of convex pattern patterns formed thereon with a charged particle beam;

forming a profile waveform based on ~~[[a]]~~ charged particle particles emitted from the scanned portion of the sample;

~~detecting a peak in~~ forming a derivative waveform based on the formed profile waveform;

~~comparing a convergence of a foot portion of each peak on either side thereof in the detected profile waveform~~ first distance, along a baseline, between a peak top of a first side of the derivative waveform and a position where the derivative waveform converges, with a second distance, along the baseline, between a peak top of a second side of the derivative waveform and a position where the derivative waveform converges; and

~~determining when the foot portion on one side of said peak converges more gradually than the foot portion on the other side, that a portion of said sample corresponding to a non-peak portion of the profile waveform which is continuous from the foot portion on the one side to be a convex portion, and that a portion of the sample corresponding to a non-peak portion of the profile waveform which is continuous from the foot portion on the other side is a concave portion~~ that a convex part is on the first side of the formed waveform and that a concave part is on the second side thereof, if the first distance is greater than the second distance.

2. (Currently Amended) A method of determining ~~[[the]]~~ a concavity and/or a convexity on a sample, comprising the steps of:

scanning a portion of a sample including a plurality of concave pattern patterns formed thereon with a charged particle beam;

forming a profile waveform based on ~~[[a]]~~ charged ~~particle~~ particles emitted from the scanned portion of the sample;

~~detecting a peak in~~ forming a derivative waveform based on the formed profile waveform;

~~comparing a convergence of a foot portion of each peak on either side thereof in the detected profile waveform~~ first distance, along a baseline, between a peak top of a first side of the derivative waveform and a position where the derivative waveform converges, with a second distance, along the baseline, between a peak top of a second side of the derivative waveform and a position where the derivative waveform converges;

~~determining when the foot portion on one side of said peak converges more steeply than the other foot portion on the other side, that a portion of said sample corresponding to a non-peak portion of the profile waveform which is continuous from the foot portion on the one side is a concave portion, and that a portion of the sample corresponding to a non-peak portion of the profile waveform which is continuous from the foot portion on the other side is a convex portion~~ that a concave part is on the first side of the formed waveform and that a convex part is on the second side thereof, if the first distance is smaller than the second distance.

3. (Currently Amended) The method of determining the concavity and/or convexity on a sample according to claim 1 or 2, wherein the charged particle beam is incident on the plane of a substrate perpendicularly.

4. (Original) The method of determining the concavity and convexity on a sample according to claim 3, wherein said profile waveform is created based on a charged particle emitted from a location of said sample that has been scanned as the charged particle beam that is perpendicularly incident on the sample is scanned by a scanning deflector.

5. (Original) The pattern position detection method according to claim 1 or 2, wherein the position of a pattern on said sample is identified based on the information about the concave and/or convex portions that have been determined.

6. (Original) The pattern position detection method according to claim 1 or 2, wherein a convex-concave pattern formed on a substrate is scanned by a charged particle beam, a profile waveform is created based on a reflected or secondary charged particle emitted from a scanned location, and a specific position of said pattern on said substrate is detected based on pattern convex-concave information obtained by said method of determining the concavity and convexity on a sample.

7. (Original) The pattern position detection method according to claim 6, wherein a comparison is made with concavity-convexity information about a pre-registered model, in order to detect a specific position on said pattern on said sample.

8. (Original) The pattern position detection method according to claim 6, wherein a comparison is made with the profile shape of a pre-registered model,

and an error is detected if an evaluation value indicating the difference in their profile shapes exceeds a predetermined value.

9. (Original) The pattern position detection method according to claim 6, wherein a comparison is made with the number of edges in a pre-registered model, and an error is detected if the numbers of edges exceed a predetermined value.

10. (Currently Amended) A method of determining ~~[[the]]~~ a concavity and/or a convexity on a sample, comprising the steps of:

scanning a portion of a sample comprising a plurality of convex and/or concave ~~pattern~~ patterns formed thereon with a charged particle beam;

forming a profile waveform based on a charged particle emitted from the scanned portion of the sample;

forming a ~~differentiated~~ derivative waveform based on the formed ~~of said~~ profile waveform;

~~detecting a pair of continuous positive and negative peaks in the differentiated waveform;~~

~~determining, when, comparing~~ for each pair of ~~[[the]]~~ continuous positive and negative peaks in the ~~detected-differentiated~~ derivative waveform, ~~the interval~~ a first distance in a negative peak of a pair of the continuous positive and negative peaks between a peak position and a position where the ~~differentiated~~ derivative waveform reaches zero or converges, ~~is longer than the same interval~~ with a second distance in a positive peak of the pair of the continuous positive and negative peaks between a peak position and a positive where the derivative waveform reaches zero or converges; and

determining that a convex part is a portion [[of]] on the sample that corresponds to a non-peak portion of the differentiated derivative waveform where the positive a negative peak converges is a concave portion, and that a concave part is a portion on the sample that corresponds to a non-peak portion of the differentiated derivative waveform where a negative peak converges is a convex portion relative to the concave portion positive peak converges, if the first distance is longer than the second distance.

11. (Currently Amended) A charged particle beam apparatus comprising:

a charged particle source,

a scanning deflector for scanning a charged particle beam emitted by said charged particle source,

a detector for detecting a charged particle emitted by a sample irradiated [[by]] with said charged particle beam, and

a control processor that comprises:

a peak-detecting means profile waveform forming means for forming a profile waveform based on the detected of a portion of the sample that has been irradiated with a charged particle beam based on a detection output of the detector and detecting a peak in the formed profile waveform;

a derivative waveform forming means for forming a derivative waveform based on the formed profile waveform;

a comparison means for comparing a convergence of a foot portion of each peak on either side thereof in the detected profile waveform first distance, along a baseline, between a peak top of a first side of the derivative waveform and a position where the derivative waveform converges, with a second

distance, along the baseline, between a peak top of a second side of the derivative waveform and a position where the derivative waveform converges;  
and

a determination means ~~that determines, based on the result of comparison made by the comparing means, when the foot portion on one side converges more gradually than the foot portion on the other side, that a portion of the sample corresponding to a non-peak portion of a differentiated waveform which is continuous from the foot portion on the one side is a convex portion, and that a portion of the sample corresponding to a non-peak portion of the differentiated waveform which is continuous from the foot portion on the other side is a concave portion relative to the convex portion~~ for determining that a convex part is on the first side of the formed waveform and that a concave part is on the second side thereof, if the first distance is greater than the second distance.